

MODULE 1 INTRODUCTION



Government of Sudan

**Training Course on
Inpatient Management of
Severe Acute Malnutrition**

**Children 6–59 Months with SAM
and Medical Complications**

June 2011

This modified version of the 2002 World Health Organisation's *Training Course on Inpatient Management of Severe Acute Malnutrition (SAM)* is the practical application of the 2009 Government of Sudan (GOS) Federal Ministry of Health (FMOH) *Interim Manual Community-Based Management of Severe Acute Malnutrition (November 2009)*. The training course is made possible by the generous support of the American people through the support of the Office of U.S. Foreign Disaster Assistance, Bureau for Democracy, Conflict and Humanitarian Assistance, and the Office of Health, Infectious Diseases, and Nutrition, Bureau for Global Health, United States Agency for International Development (USAID), under terms of Cooperative Agreement No. AID-OAA-A-11-00014, through the FANTA-2 Bridge, managed by FHI 360. The contents are the responsibility of FHI 360 and do not necessarily reflect the views of USAID or the United States Government.

Illustrations for modules: Susan Kress

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Acronyms and Abbreviations

AIDS	acquired immune deficiency syndrome
ART	antiretroviral therapy
AWG	average daily weight gain
BMI	body mass index
cm	centimetre(s)
CMAM	Community-Based Management of Acute Malnutrition
CMV	combined mineral and vitamin mix
dl	decilitre(s)
ENA	Essential Nutrition Actions
FMOH	Federal Ministry of Health
g	gram(s)
GOS	Government of Sudan
Hb	haemoglobin
HFA	height-for-age
HIV	human immunodeficiency virus
IGF	insulin growth factor
IM	intramuscular
IMNCI	Integrated Management of Neonatal and Childhood Illness
IU	international unit(s)
IV	intravenous
IYCF	infant and young child feeding
kcal	kilocalorie(s)
kg	kilogram(s)
L	litre(s)
LOS	length of stay
M&R	monitoring and reporting
MAM	moderate acute malnutrition
ml	millilitre(s)
mm	millimetre(s)
MUAC	mid-upper arm circumference
µg	microgram(s)
NG	nasogastric
NGT	nasogastric tube
OPD	outpatient department
ORS	oral rehydration solution
PCV	packed cell volume
PLHIV	people living with HIV
PMTCT	prevention of mother-to-child transmission of HIV
QI	quality improvement
ReSoMal	Rehydration Solution for Malnutrition
RUTF	ready-to-use therapeutic food
SAM	severe acute malnutrition
SFP	supplementary feeding programme
TB	tuberculosis
UNSCN	United Nations Standing Committee on Nutrition
WFA	weight-for-age
WFH	weight-for-height
WFP	World Food Programme
WHO	World Health Organisation

The Importance of Severe Acute Malnutrition as a Health Problem

Severe acute malnutrition (SAM) is one of the most common causes of morbidity and mortality among children under 5 years of age worldwide. Many children under 5 with SAM die at home without care or present to hospital too late and with medical complications.

Children with SAM often die because physicians unknowingly use practices that are suitable for most children, but highly dangerous for children with SAM. With appropriate case management for SAM in Inpatient Care and additional treatment in Outpatient Care, the lives of many children can be saved, and mortality associated with SAM can be drastically reduced to less than 10%.

The World Health Organisation (WHO) developed a manual in 1999 that describes case management practices for children with SAM entitled *Management of severe malnutrition: a manual for physicians and other senior health workers*. WHO, with support of a group of experts (the WHO Nutrition Guidance Expert Advisory Group [NUGAG]), is in the process of updating this manual; therefore, for the purposes of this training, we will not share a copy of the 1999 manual.

Instead, this training course uses the job aids for Inpatient Care and the Government of Sudan Interim Manual: Community-Based Management of Severe Acute Malnutrition, Version 1.0 (November 2009) (the CMAM Manual) as references; these materials reflect the latest WHO guidance through the various publications since 2006¹. The seven training modules and the set of job aids for Inpatient Care are the major tools to use during this training course.



Open your CMAM Manual now and read its introduction on [pages 1–11](#).

Purpose of This Training Course

This training course is designed for physicians and nurses (and dietitians and nutritionists) in hospitals that provide Inpatient Care for the management of SAM with medical complications. It covers all aspects of case management of children 6–59 months with SAM and medical complications in Inpatient Care until the condition of the child is stabilized and the child can continue treatment in Outpatient Care. It also covers the treatment of infants under 6 months with SAM, and the treatment of children 6–59 months with SAM with and

¹ WHO, UNICEF and SCN. 2006. 'Proceedings of the WHO, UNICEF, and SCN Informal Consultation on Community-Based Management of Severe Malnutrition in Children', *Food and Nutrition Bulletin*, Volume 27, Number 3 (Supplement).
<http://foodandnutritionbulletin.org/FNB/index.php/FNB/article/viewFile/1181/1201>; WHO, World Food Programme, the United Nations System Standing Committee on Nutrition and UNICEF. 2007. 'Community-Based Management of Severe Acute Malnutrition'.
http://www.who.int/nutrition/topics/Statement_community_based_man_sev_acute_mal_eng.pdf; and WHO and UNICEF. 2009. 'WHO child growth standards and the identification of severe acute malnutrition in infants and children'.
http://www.unicef.org/nutrition/files/stmt_child_growth_sam_final.pdf.

without medical complications until full recovery in Inpatient Care in the absence of ready-to-use-therapeutic food (RUTF). While the training course focuses on Inpatient Care, case management participants are introduced to the other components of the Community-Based Management of Acute Malnutrition (CMAM) approach to understand the links and are prepared for the collaboration with colleagues involved in the other components.

Dieticians and nutritionists may also benefit from this course if they are clustered in a separate learning group and focus on what is most appropriate to do their tasks well. The course teaches skills and knowledge specifically needed for management of children 6–59 months with SAM with poor appetite and/or medical complications in Inpatient Care. The course does not teach basic medical techniques that are taught in schools of medicine and nursing (such as how to insert an IV or take a blood sample).

It is expected that participants will return to their hospitals and begin to implement the case management practices described in this course. To implement these practices, staff working in Inpatient Care for the management of SAM should develop an action plan. An example of an action plan can be found in **Module 6, Monitoring, Problem Solving and Reporting, Annex C**. Certain basic supplies and equipment are required for these practices; they are listed in **Annex A** of this module and in the CMAM Manual, Annex 32, Checklists of Materials Needed in Inpatient Care.

Training Course Methods and Materials

This training course uses a variety of methods of instruction, including reading, written exercises, discussions, role-plays, video, demonstrations and practice in a real Inpatient Care site. Practice, whether in written exercises or at the Inpatient Care site, is considered a critical element of instruction.

Small groups of participants are led and assisted by ‘facilitators’ as they work through the course modules (booklets that contain units of instruction). The facilitators are not lecturers, as in a traditional classroom. Their role is to answer questions, provide individual feedback on exercises, lead discussions, structure role-plays, etc.

To a great extent, participants work at their own pace through the modules, although in some activities, such as role-plays and discussions, the small group will work together.

The modules in this Inpatient Management of SAM training course include:

1. **Introduction**
2. **Principles of Care**
3. **Initial Management**
4. **Feeding**
5. **Daily Care**
6. **Monitoring, Problem Solving and Reporting**
7. **Involving Mothers in Care**

The course director, facilitators and clinical instructor will use:

- **Course Director Guide**
- **Facilitator Guide**
- **Clinical Instructor Guide**

In addition to the seven modules (and three guides), the following materials will be used:

Photographs booklet

Videos

1. Transformations
2. Emergency Treatment
3. Teaching Home Feeding
4. Malnutrition and Mental Development

Slides

- Slides for Facilitator Training
- Slides on Orientation of CMAM

Reference

- CMAM Manual
- Operational Guide for Inpatient Care

Set of Job Aids

Laminated Set

- Admission and Discharge Criteria for the Management of Severe Acute Malnutrition in Children under 5
- Routine and Other Medicine Protocols and Vaccines for Children under 5 with SAM in Inpatient Care
- Action Protocols in Inpatient Care
- Danger Signs for the Management of Severe Acute Malnutrition in Children under 5 in Inpatient Care
- 10 Steps for the Management of SAM in Children 6–59 Months in Inpatient Care
- Pathophysiology Basis for the Treatment of Severe Acute Malnutrition
- Hypernatraemic Dehydration in Children under 5 in Inpatient Care
- Weight-for-Height/Length Look-Up Tables
- F-75 Look-Up Tables
- F-100 Look-Up Tables
- F-100-Diluted Look-Up Tables
- Use of RUTF in Children 6-59 months with SAM in Inpatient Care and RUTF Appetite Test
- Guidance Table to Identify Target Weight for Discharge from Management of Severe Acute Malnutrition for Children 6–59 Months
- Entry and Exit Categories for Monitoring the Management of Severe Acute Malnutrition in Children 6–59 Months

Wall Charts

- Admission and Discharge Criteria for the Management of Severe Acute Malnutrition in Children under 5
- Action Protocols in Inpatient Care
- Danger Signs for the Management of Severe Acute Malnutrition in Children under 5 in Inpatient Care
- 10 Steps for Management of SAM in Children 6–59 Months in Inpatient Care

Forms and Checklists

- Inpatient Management Record
- Daily Feeds Chart
- Referral Form
- Site Tally Sheet
- Monthly Site Report for CMAM
- Supervisor's Checklist

Other Documents

- Support reading (see **Annex C**, [page 17](#))
- Terminology for CMAM (see **Annex D**, [page 18](#))
- List of outpatient care sites with catchment area, and names community outreach workers (developed per Inpatient Care site) (if available)

Note on Keeping Training Materials Up to Date

The training materials cover all case management practices and are consistent with the best practices adopted and promoted by the Federal Ministry of Health (FMOH), which are summarized in the Inpatient Care job aids and described in the CMAM Manual. It is expected that with new emerging evidence the FMOH will adapt treatment protocols and promote new practices, and therefore regularly update the job aids. Training materials might also need to be updated to reflect changes in the job aids.

Learning Objectives for Case Management Training

Each module and clinical session in this course provides information and examples and allows you to practise skills necessary for managing children with SAM with poor appetite and/or medical complications in Inpatient Care. The skills and information presented in each module are briefly outlined below.

Module 2: Principles of Care

- 1.0 Defining SAM
- 2.0 Recognising clinical signs of SAM
- 3.0 Weighing and measuring a child
- 4.0 Identifying a child with SAM
- 5.0 How does the physiology of SAM affect care of a child?
- 6.0 Overview of the essential components of care
- 7.0 Understanding procedures for referral and discharge

Module 3: Initial Management

- 1.0 Identifying and managing a child with SAM with medical complications in Inpatient Care
- 2.0 Preparing Rehydration Solution for Malnutrition (ReSoMal)
- 3.0 Selecting appropriate antibiotics and calculating dosages
- 4.0 Testing and treating for malaria, HIV and TB
- 5.0 Keeping a written record of initial findings and treatments

Module 4: Feeding

- 1.0 Preparing F-75 and F-100 and learning about RUTF
- 2.0 Feeding F-75 during Stabilisation
- 3.0 Adjusting to RUTF and/or F-100 during Transition
- 4.0 Feeding on RUTF or Freely with F-100 during Rehabilitation
- 5.0 Planning feeding for Inpatient Care
- 6.0 Management of SAM in Infants under 6 Months

Module 5: Daily Care

- 1.0 Handling a child with SAM with poor appetite and medical complications
- 2.0 Caring for the skin and bathing
- 3.0 Giving prescribed antibiotics and other medications and supplements
- 4.0 Caring for the eyes
- 5.0 Monitoring pulse, respirations and temperature, and watching for danger signs
- 6.0 Continuing care at night
- 7.0 Testing the appetite with RUTF
- 8.0 Preparing and maintaining a weight chart

Module 6: Monitoring, Problem Solving and Reporting

- 1.0 Using a process to identify and solve problems on case management
- 2.0 Monitoring and solving problems with an individual patient
- 3.0 Monitoring overall weight gain in Inpatient Care Rehabilitation Phase
- 4.0 Monitoring patient outcomes
- 5.0 Monitoring case management practices and procedures
- 6.0 Solving problems
- 7.0 Monitoring and reporting on Inpatient Care

Module 7: Involving Mothers in Care

- 1.0 Encouraging involvement of mothers
- 2.0 Involving mothers in comforting, feeding and bathing children
- 3.0 Teaching groups of mothers about feeding and care
- 4.0 Preparing for continuing treatment and feeding the child with RUTF at home
- 5.0 Teaching mothers the importance of stimulation and how to make and use toys
- 6.0 Giving advice on referral to Outpatient Care, continuing treatment at home and follow-up visits
- 7.0 Making special arrangements for follow-up in case early discharge is unavoidable

Additional Objective

- Improving quality of care: **Module 4, Feeding**, and **Module 6, Monitoring, Problem Solving and Reporting**, encourage you to discuss ideas for improving feeding-related tasks and quality care in your hospital without requiring external resources, after you return from this course.

Objectives for Clinical Sessions

Each clinical session has specific objectives for observation and practice. The course schedule is designed so that participants learn about skills in the modules before practising those skills in a clinical session.

Day 1: Tour of Ward

- Observe the admissions area
- Observe the emergency treatment area
- Observe how the SAM ward or area is organised
- Observe the kitchen area
- Observe any special areas for play, health education, etc.

Day 2: Clinical Signs and Anthropometric Measurements

- Observe children with clinical signs of SAM
- Look for signs of SAM and medical complications
- Measure mid-upper arm circumference (MUAC)
- Measure weight and length/height
- Look up weight-for-height (WFH) z-score (WHZ)
- Look up target weight for discharge
- Test appetite with RUTF

- Identify children with SAM, review admission criteria and discuss treatment in Inpatient Care and referral to Outpatient Care

Day 3: Initial Management

- Observe initial management of SAM in children
- Identify clinical signs of SAM and medical complications: hypoglycaemia, hypothermia, shock, dehydration, severe anaemia and corneal ulceration
- Practise using dextrostix
- Practise filling out an Inpatient Management Record during initial management
- Assist in conducting initial management, if feasible, such as:
 - Check for signs of shock: cold hands with slow capillary refill or weak or fast pulse
 - Take rectal temperature
 - Give bolus of glucose for hypoglycaemia
 - Warm child
 - Give first feed

Day 4: Flexible Half-Day, Optional Clinical Session

Any of the preceding activities may be repeated for extra practice. If case management in the hospital is good, participants may be assigned to ‘shadow’ and assist a health care provider in the hospital for part of the day. This day may also be a good opportunity to observe a teaching session with mothers² or a play session.

Day 5: Initial Management and Feeding

- Observe and assist in conducting initial management, if feasible, including:
 - Identify signs of possible dehydration in a child with SAM
 - Measure and give ReSoMal
 - Monitor a child on ReSoMal
 - Determine antibiotics and dosages
- Practise testing the appetite with RUTF: appetite test, for a child who shows appetite and is clinically well and alert
- Practise conducting the supplemental suckling technique if possible
- Observe nurses (and nutritionists) measuring and giving feeds
- Practise measuring, giving and recording feeds

Day 6: Feeding

- Review 24-Hour Intake Charts and plan feeds for the next day
- Determine if child is ready for RUTF and/or F-100; practise testing the appetite with RUTF: appetite test (continued)
- Prepare F-75, F-100 and ReSoMal, and learn the contents of RUTF
- Practise measuring, giving and recording feeds (continued)

² The term ‘mother’ is used throughout the modules and guides. However, it is understood that the person who is responsible for the care of the child might not always be that child’s mother, but rather some other caregiver. However, for the sake of readability, ‘mother’ means ‘mother/caregiver’ throughout the modules and guides, ‘she’ means ‘she or he’ and ‘her’ means ‘her or his’.

Day 7: Daily Care and Monitoring Quality Care

- Keep Inpatient Management Records on children observed and cared for
- Participate in daily care tasks, as feasible:
 - Measure pulse rate, respiratory rate and temperature
 - Administer eye drops, antibiotics, other drugs and supplements; change eye bandages, etc.
 - Weigh child and record weight (on Daily Care and on weight chart of Inpatient Management Record)
 - Look up target weight for discharge and mark on weight chart
 - Observe and assist with bathing children
- Assist with feeding (continued)
- Discuss progress to referral and/or discharge and decide when the child is ready; practise referral to Outpatient Care when stabilised and discharge when full recovery
- Monitor quality of care using checklist
- Practise filling out site tally and report sheets, and assess performance

Additional Objectives

- Observe a health and nutrition education session (and a cooking session) with mothers
- Observe a play session

Annex A: Equipment and Supplies for Inpatient Management of Severe Acute Malnutrition

Ward Equipment/Supplies

- Running water
- Thermometers (preferably low-reading)
- Child weighing scales (and item of known weight for checking scales)
- Infant weighing scales with 10 g precision (and item of known weight for checking scales)
- MUAC tapes
- Height board for measuring height and length (and pole of known length for checking accuracy)
- Adult beds with mattress
- Bed sheets
- Insecticide treated bednets
- Blankets or wraps for warming children
- Incandescent lamp or heater
- Wash basin for bathing children
- Potties
- Safe, homemade toys
- Clock
- Calculator

Pharmacy Equipment/Supplies

- Oral rehydration solution (ORS) for use in making Rehydration Solution for Malnutrition (ReSoMal) (or commercial ReSoMal)
- Combined mineral vitamin mix (CMV)
- Iron syrup (e.g., ferrous fumarate)
- Folic acid
- Vitamin A (Retinol 100,000 and 200,000 IU capsules)
- Glucose (or sucrose)
- IV fluids – one of the following, listed in order of preference:
 - Half-strength Darrow's solution with 5% glucose
 - Ringer's lactate solution with 5% glucose*
 - Half-normal (0.45%) saline with 5% glucose*

* If either of these is used, add sterile potassium chloride (20 mmol/L) if possible.
- Normal (0.90%) saline (for soaking eye pads)
- Sterile water for diluting
- Vaccines as per the national expanded programme of immunisation
- Dextrostix
- Haemoglobinometer
- Supplies for intravenous (IV) fluid administration :
 - Scalp vein (butterfly) needles, gauge 21 or 23
 - Heparin solution, 10–100 units/ml
 - Poles or means of hanging bottles of IV fluid
 - Tubing
 - Bottles or bags
- Paediatric nasogastric tubes (NGTs)
- Sticky tape

- Syringes (50 ml for feeds)
- Syringes (2 ml for drugs, 5 ml for drawing blood, 10 ml)
- Sterile needles
- Eye pads
- Bandages
- Gauze
- Supplies for blood transfusion:
 - Blood packs
 - Bottles
 - Syringes and needles
 - Other blood collecting materials

Drugs

- Amoxicillin
- Amoxicillin-clavulanic acid
- Gentamicin
- Chloramphenicol
- Ceftriaxone
- Cotrimoxazole
- Mebendazole and/or albendazole
- Tetracycline eye ointment or chloramphenicol eye drops
- Atropine 1% eye drops
- Paracetamol
- Antimalarial: Artemisinin Combination Therapy (ACT)
- Metronidazole

For Skin

- Nystatin
- Benzyl benzoate
- Whitfield's ointment
- Gentian violet
- Paraffin gauze
- Potassium permanganate
- Zinc oxide ointment

Laboratory Resources

- Malaria diagnostic test
- TB tests (x-ray, culture of sputum, Mantoux)
- Urinalysis
- Stool culture
- Blood culture
- Cerebrospinal fluid culture

Hygiene Equipment/Supplies of Mothers and Staff

- Toilet, hand-washing and bathing facilities
- Soap for hand-washing
- Place for washing bedding and clothes
- Method for trash disposal

Kitchen Equipment/Supplies

- Dietary scales able to weigh to 5 g
- Electric blender or manual whisks
- Large containers and spoons for mixing/cooking feed for the ward
- Cooking stove
- Feeding cups, saucers, spoons
- Measuring cylinders (or suitable utensils for measuring ingredients and leftovers)
- Jugs (1-litre and 2-litre)
- Refrigeration (if possible)
- For making F-75 and F-100:
 - Dried skimmed milk, whole dried milk, fresh whole milk or long-life milk
 - Sugar
 - Cereal flour
 - Vegetable oil
 - Clean water supply
- Food for mothers
- Foods similar to those used in homes (for teaching transition to homemade complementary foods)

Reference

- CMAM Manual
- Operational Guide for Inpatient Care

Job Aids

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Forms and Checklists

- Inpatient Management Record
- Daily Feeds Chart
- Referral Form
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- Monthly Site Report for CMAM
- Supervisor's Checklist

Other Documents

- List of outpatient care sites with catchment area, and names community outreach workers (developed per Inpatient Care site) (if available)
- Job descriptions

Staff

Clinical Care Staff

This includes physicians, senior nurses and junior nurses. A physician is recommended but is not always necessary. Only clinicians who are specifically trained in the management of SAM should treat these patients, because treatment for the non-malnourished child could be dangerous for the malnourished child.

A ratio of 1 clinician per 10 patients is considered appropriate in Inpatient Care.

Feeding Assistants

Feeding assistants are in charge of weighing the child, supervising meals, interacting with mothers, monitoring clinical warning signs and filling in most of the information on the patient's Inpatient Management Record. Other staff in this category could be in charge of the emotional and physical stimulation programme.

A ratio of 1 assistant per 10 patients is considered appropriate in Inpatient Care.

Support Staff

Cleaners and kitchen staff are vital to maintaining a tidy environment and preparing therapeutic milks and food for mothers. In large centres, a person in charge of the logistics and transport will be necessary. Guardians, storekeepers and other ancillary staff might be needed depending on the context and size of the facility.

Supervisors

One supervisor is needed for each ward with Inpatient Care (usually, but not necessarily, a clinician).

Annex B: Orientation on Community-Based Management of Acute Malnutrition, Slide Presentation

Orientation on Community-Based Management of Acute Malnutrition

1

Objectives of the Orientation

1. Describe the evolution and the concept of Community-Based Management of Acute Malnutrition (CMAM)
2. Discuss a strategy for quality improvement of management of SAM in your hospital

2

Terminology

- CMAM: Community-Based Management of Acute Malnutrition
- Others:
 - Integrated Management of Acute Malnutrition, Management of Acute Malnutrition, Community-Based Therapeutic Care (CTC)

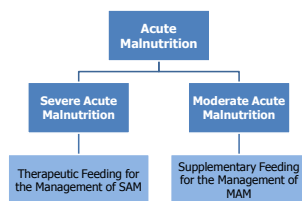
3

Management of Severe Acute Malnutrition: Evolving protocols, based on evidence

- World Health Organization (WHO) 1999:
 - Facility-based care for the management of severe acute malnutrition (SAM)
 - Children under 5 with SAM are treated **until full recovery** in paediatric ward, nutrition rehabilitation unit, therapeutic feeding centre

4

WHO 1999 Classification for the Management of Acute Malnutrition



5

Facility-Based Care: Challenges

- Centralised sites leading to low coverage and late presentation
- Overcrowding leading to elevated risk of cross-infections
- Heavy staff workload
- Opportunity cost of caregiver for long stay
- High default rate due to long stay
- Potential engagement of caregiver in high-risk behaviour to cover cost of meals?

6



7

Ready-to-Use Therapeutic Food (RUTF)



- Energy- and nutrient-dense lipid-based paste: 500 kcal/92 g
- Same formula as F-100 (except it contains iron)
- No microbial growth, even when opened
- Safe and easy for home use
- Is not given to infants under 6 months

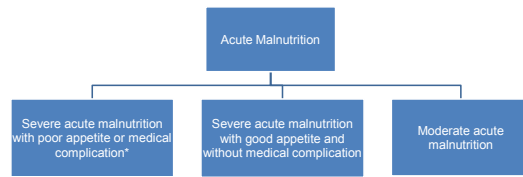
8

Management of Severe Acute Malnutrition: Evolving protocols, important new elements

- **Adapted classification** of SAM with or without medical complications
 - Children 6–59 months with SAM without medical complications treated in Outpatient Care with RUTF and presumptive antibiotics
 - Children 6–59 months with SAM and medical complications treated in Inpatient Care, and referred to Outpatient Care after stabilisation to continue treatment at home
- **Mid-upper arm circumference (MUAC):** independent criterion for SAM
- **WHO 2006 child growth standards:** adaptation of admission and discharge criteria

9

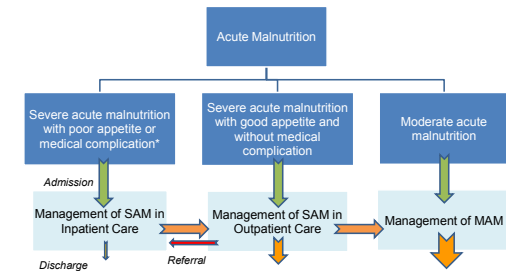
WHO 2007 Classification for the Management of Acute Malnutrition (children 6–59 months)



* **Medical complication:** anorexia or poor appetite, intractable vomiting, convulsions, lethargy or not alert, unconsciousness, hypoglycaemia, high fever, hypothermia, severe dehydration, lower respiratory tract infection, severe anaemia, eye signs of vitamin A deficiency, or skin lesion

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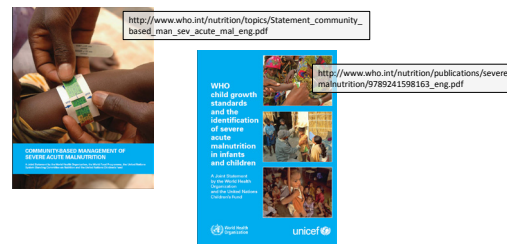
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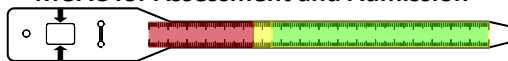
Management of Severe Acute Malnutrition: Evolving protocols, important new elements



WHO reviewing its nutrition guidelines for 2012.

12

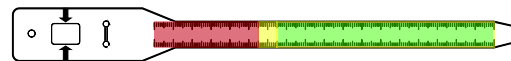
MUAC for Assessment and Admission



- Identifies children at highest risk of death
- Measures muscle mass (nutrient store)
- Is a transparent and understandable measurement
- Is easy-to-use tool; can be used by all health care providers, also community-based outreach workers after being trained

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MUAC (2)



Pending publication (A. Briend et al. 2011):

- MUAC is better than WFH z-score to identify high-risk children
- Using both WFH < -3 z-score **AND** MUAC < 115 mm increases specificity but decreases sensitivity to identify high-risk children:
 - *Missing children at risk*
- Using WFH < -3 z-score **OR** MUAC < 115 mm increases sensitivity but decreases specificity to identify high-risk children:
 - *Selecting children not at risk*
- There is no advantage for programmes in combining WFH z-score and MUAC to identify high-risk children

Pending studies: Safety of MUAC for monitoring and discharge

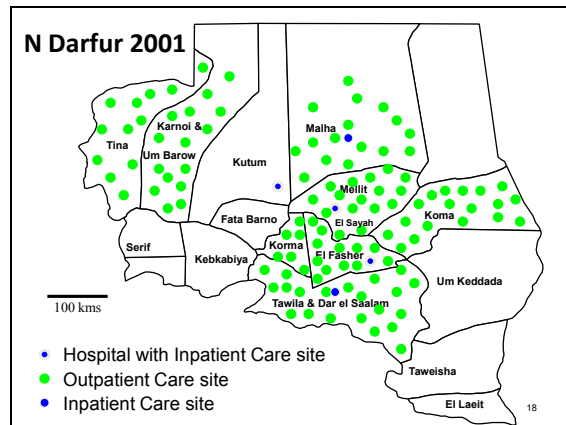
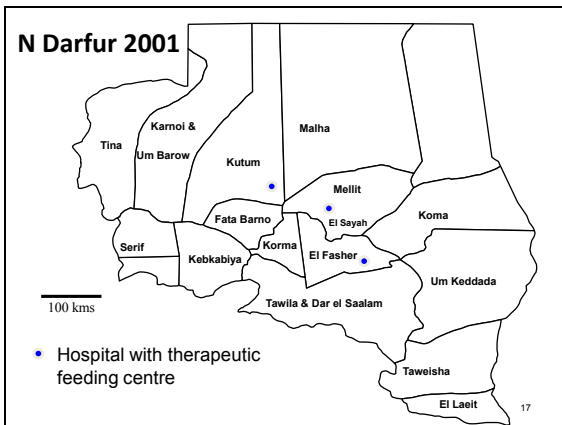
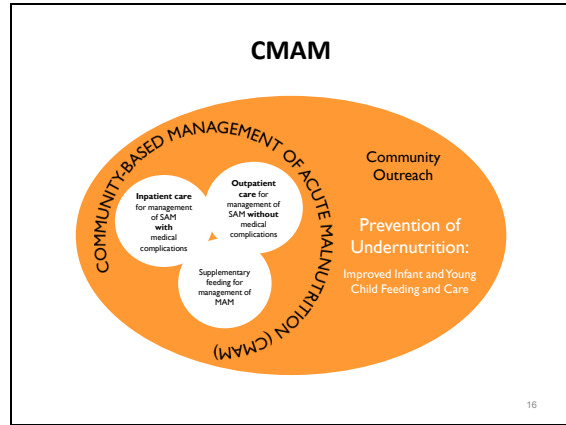
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CMAM Overview

A community-based approach for the management of SAM in children under 5:

- **Community outreach** for community involvement and early and active detection of acute malnutrition cases and referral for treatment
- Most children with **SAM** have good appetite and are without medical complications (more than 80%) and can thus be treated as **outpatients** at accessible, decentralised sites
- Children with **SAM** and poor appetite or medical complications (less than 20%) are treated as **inpatients** at centralised sites
- Children with **MAM** are treated at decentralised sites

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Principles of CMAM

- Maximum access: **decentralised** care with improved treatment coverage (those who need treatment are treated)
- **Timely access** to treatment (early and active detection and referral before onset of disease)
- **Appropriate medical and nutrition care** (specialised care adapted to severity of illness)
- Care for **as long as needed** (limiting defaulting)

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Components of CMAM (1)

Community Outreach: to increase access and service uptake (improved treatment coverage)

Steps:

- **Community assessment:**
 - Strategy for outreach activities builds on existing formal and informal community systems and structures
- **Community mobilisation:**
 - Involves the community, raising awareness
- **Community outreach workers or volunteers:**
 - Early and active detection and referral of children with SAM before the onset of medical complications
 - Home visits for problem cases
 - Health and nutrition education

→ Linking with existing community initiatives

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Components of CMAM (2)

Outpatient Care:
Children with SAM with good appetite (appetite test) and without medical complications are treated at decentralised health facilities and at home

Steps:

- Initial medical and anthropometry assessment
- Decision for treatment in Outpatient Care or Inpatient Care
- Medical treatment and nutrition rehabilitation with RUTF at home
- Weekly (or bi-weekly) medical and anthropometry assessment and monitoring of treatment progress

ESSENTIAL: A good referral system to Inpatient Care, based on Action Protocols

21

Components of CMAM (3)

Inpatient Care:
Children with SAM with poor appetite or with medical complications are treated in facility-based care until their condition is stabilised

Steps:

- Medical assessment and life-saving treatment
- Stabilisation: medical treatment and nutrition rehabilitation with therapeutic milk
- Transition: as soon as appetite returns, gradual introduction of RUTF
- Referral to Outpatient Care as soon as child eats RUTF well, medical complication is resolving and child is clinically well and alert

ESSENTIAL: Good referral system to Outpatient Care

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Components of CMAM (4)

Management of moderate acute malnutrition (MAM) with a special food supplement following specifications for the management of MAM

Strategies:

- Individual: Targeted supplementary feeding for children with MAM 6–59 months
- Population: Blanket feeding for all children 6–24 months

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Components of CMAM (5)

Improved Infant and Young Child Feeding and Care Practices

Health and Nutrition Education
Social and Behaviour Change Communication

→ **Linking CMAM with preventive initiatives**

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Management of CMAM

Management of services at national, subnational and district levels

- Planning and budgeting
- Supply management
- Human resources management
- Capacity strengthening
- Supportive supervision, quality improvement
- Monitoring and reporting (performance)
- Surveillance nutrition situation
- Evaluation (impact)

25

CMAM Support for Strengthening Capacities

CMAM Support Team

CMAM Technical Working Group

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Annex C: References for Support Reading

Briend, André; Maire, Bernard; Fontaine, Olivier; and Garenne, Michel. 'Mid-upper arm circumference and weight-for-height to identify high risk malnourished under-5 children' (Accepted for publication).

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Errata 2009. http://www.fantaproject.org/downloads/pdfs/CMAMerrata_June09.pdf.

IASC, Action contre la Faim, UCL, ENN, 2010. 'Management of Acute Malnutrition in Infants (MAMI) Project, Technical Review: Current evidence, policies, practices & programme outcomes'. [http://www.ennonline.net/pool/files/ife/mami-report-complete\(1\).pdf](http://www.ennonline.net/pool/files/ife/mami-report-complete(1).pdf).

Kerac, Marko et al. 2011. 'Prevalence of wasting among under 6-month-old infants in developing countries and implications of new case definitions using WHO growth standards: a secondary data analysis', *British Medical Journal*.
<http://adc.bmj.com/content/early/2011/02/01/adc.2010.191882.full>.

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WHO and UNICEF. 2009. 'WHO child growth standards and the identification of severe acute malnutrition in infants and children: A Joint Statement by the World Health Organization and the United Nations Children's Fund'. <http://www.who.int/nutrition/publications/severemalnutrition/9789241598163/en/index.html>.

WHO, WFP, UNSCN and UNICEF. 2007. 'Community-based management of severe acute malnutrition: A Joint Statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition and the United Nations Children's Fund'. <http://www.who.int/nutrition/publications/severemalnutrition/978-92-806-4147-9/en/index.html>.

Annex D: Terminology for CMAM

Acronyms

CHW	community health worker
CMAM	Community-Based Management of Acute Malnutrition
GAM	global acute malnutrition
HFA	height-for-age
IM-SAM	Integrated Management of Severe Acute Malnutrition
MAM	moderate acute malnutrition
MOH	Ministry of Health
MUAC	mid-upper arm circumference
NGO	nongovernmental organisation
RUTF	ready-to-use therapeutic food
SAM	severe acute malnutrition
SD	standard deviation
TOT	training of trainers
WFA	weight-for-age
WFH	weight-for-height
WHO	World Health Organisation

Acute Malnutrition	Acute malnutrition is a form of undernutrition. It is caused by a decrease in food consumption and/or illness, resulting in bilateral pitting oedema or sudden weight loss. It is defined by the presence of bilateral pitting oedema or wasting (low MUAC or low WFH).										
Anthropometry	Anthropometry is the study and technique of human body measurement. It is used to measure and monitor the nutritional status of an individual or population group.										
Appetite	Appetite is the decisive criterion for participation in outpatient care. An appetite test is done at admission and at all outpatient care follow-on sessions to ensure that a child can eat RUTF. If the child has no appetite, s/he must receive inpatient care.										
Cascade Training	Cascade training is a process in which an experienced trainer trains health care providers with limited experience and expertise who, in turn, pass on that knowledge and skills to other practitioners with less experience and expertise. These practitioners then train other practitioners with less experience and expertise, etc., etc., etc. Note that the knowledge and skills tend to get diluted as a result of the training that occurs later in the process being conducted further and further from the initial training. As a result, cascade training is not recommended as a training method.										
Bilateral Pitting Oedema	<p>Bilateral pitting oedema—also known as nutritional oedema or oedematous malnutrition—is a sign of SAM. It is caused by an abnormal infiltration and excess accumulation of serous fluid in connective tissue or in serous cavities. Bilateral pitting oedema is verified when thumb pressure applied on top of both feet for three seconds leaves a pit (indentation) in the foot after the thumb is lifted.</p> <p>The grades of bilateral pitting oedema are:</p> <table border="1"> <thead> <tr> <th>Grade</th> <th>Definition</th> </tr> </thead> <tbody> <tr> <td>Absent or 0</td> <td>No bilateral pitting oedema</td> </tr> <tr> <td>Grade +</td> <td>Mild: Both feet/ankles</td> </tr> <tr> <td>Grade ++</td> <td>Moderate: Both feet, plus lower legs, hands, or lower arms</td> </tr> <tr> <td>Grade +++</td> <td>Severe: Generalised bilateral pitting oedema, including both feet, legs, arms, and face</td> </tr> </tbody> </table>	Grade	Definition	Absent or 0	No bilateral pitting oedema	Grade +	Mild: Both feet/ankles	Grade ++	Moderate: Both feet, plus lower legs, hands, or lower arms	Grade +++	Severe: Generalised bilateral pitting oedema, including both feet, legs, arms, and face
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Grade +++	Severe: Generalised bilateral pitting oedema, including both feet, legs, arms, and face										
CMAM	<p>CMAM refers to the management of acute malnutrition through:</p> <ol style="list-style-type: none"> 1) Inpatient care for children with SAM with medical complications and for all other age groups with SAM, regardless of medical complications 2) Outpatient care for children 6–59 months with SAM without medical complications 3) Community outreach for community assessment, community mobilisation, early and active case detection, and referral for treatment 4) Services or programmes for the management of MAM in children 6–59 months that might be provided depending on the context 										
Community Outreach	Community outreach for CMAM includes community assessment, community mobilisation, active case-finding and referral, and case follow-up.										
Community Referral	Community referral is the process of identifying children with acute malnutrition in the community and sending them to a health facility for CMAM.										
Community Volunteer	A community volunteer is a person who conducts outreach for community mobilisation, screening, referral, and follow-up in the community. He or she can receive an incentive, but no remuneration.										

Coverage	<p><i>Geographical coverage</i> refers to the availability of CMAM (i.e., geographical access) through the decentralisation and scale-up of CMAM. <i>Geographical coverage</i> can be defined as the ratio of health facilities with CMAM to the total number of health facilities per district, region, or area at a particular time.</p> <p><i>Treatment coverage</i> refers to the access and service uptake of CMAM (access and use).</p> <p><i>Treatment coverage</i> can be defined as the ratio of children with SAM in treatment to the total number of children with SAM in the community at a particular time.</p>
Coverage Ratio	Coverage ratio is expressed as the ratio of children with SAM in the community under treatment to the total number of children with SAM identified in the community at a particular time.
Essential or Basic Health Care Package	An essential or basic health care package is a set of services provided at health facilities, as mandated by the national health policy. The package varies based on the health facility type (e.g., hospital, health centre, or health post).
F-75	Formula 75 (75 kcal/100ml) is the milk-based diet recommended by the WHO for the stabilisation of children with SAM in inpatient care.
F-100	Formula 100 (100 kcal/100ml) is the milk-based diet recommended by WHO for the rehabilitation of children with SAM after stabilisation in inpatient care. Its current principal use in CMAM services is for children with SAM in transition or children who remain in inpatient care until full recovery (e.g., children with severe mouth lesions who cannot swallow RUTF) or in the absence of RUTF. Diluted F-100 is used for the stabilisation and rehabilitation of infants under 6 months in inpatient care.
GAM	GAM is a population-level indicator referring to overall acute malnutrition defined by the presence of bilateral pitting oedema or wasting defined by WFH < -2 z-score (WHO growth standards). GAM is the combination of moderate and severe acute malnutrition (GAM = MAM + SAM).
Health Care	Health care is the prevention, treatment, and management of illness and the preservation of mental and physical well-being through the services offered by health care providers. Health care embraces all the goods and services designed to promote health, including preventive, curative, and palliative interventions, whether directed to individuals or to populations.
Health Care Provider	A health care provider is a medical, nursing, and allied health professional, including a CHW.
Health Care System	A health care system is the organised delivery of health care.
Health System	A health system consists of all structures, resources, policies, personnel, services, and programmes involved in the promotion, restoration, and maintenance of health.
HFA Index	The HFA index is used to assess stunting. It shows how a child's height compares to the height of a child of the same age and sex in the WHO standards. This index reflects a child's long-term growth pattern.
Inpatient Management of SAM with Medical Complications	A service/programme for inpatient management of SAM for children 6–59 months with SAM and medical complications and all other age groups with SAM, regardless of medical complications. Inpatient care is provided in a hospital or health facility with 24-hour care capacity.
In-Service Training	In-service training prepares health professionals to provide, e.g., CMAM, by developing specific knowledge and skills according to their job qualifications while accounting for prior learning and work experience. It includes theoretical and practical training, e.g., learning visits, classroom training, on-the-job training, tutoring or mentoring, and refresher training sessions.

Integration of CMAM	Integration of CMAM refers to the incorporation of the management of acute malnutrition into the national health system. It assumes that the health care system has the capacity and competence for providing, strengthening, adapting, and maintaining quality and effective inpatient care, outpatient care, management of MAM, and community outreach with minimal external support.
Kwashiorkor	An acute form of childhood protein-energy malnutrition characterized by oedema, irritability, anorexia, ulcerating dermatoses, and an enlarged liver with fatty infiltrates.
Malnutrition	Malnutrition occurs when an individual's dietary intake is not balanced with his or her nutritional needs. Malnutrition includes both undernutrition and overnutrition .
MAM	MAM, or moderate wasting, is defined in children under 5 by a MUAC \geq 115 mm and $<$ 125 mm or a WFH \geq -3 z-score and $<$ -2 z-score (WHO standards). Moderate wasting can be used as a population-level indicator, defined as WFH \geq -3 z-score and $<$ -2 z-score (WHO standards).
Management of illness	Management of illness is the detection and referral for diagnosis, treatment, treatment follow-up, and prevention of adverse events, e.g., relapse of illness, death.
Marasmic Kwashiorkor	Marasmic kwashiorkor is the simultaneous condition of severe wasting (marasmus) and kwashiorkor.
Marasmus	See Severe Wasting .
Medical Complications in the Presence of SAM	Medical complications in the presence of SAM that indicate the need to refer a child to inpatient care are: anorexia or poor appetite, convulsions, high fever, hypoglycaemia or hypothermia, intractable vomiting, lethargy or not alert, lower respiratory tract infection, severe anaemia, severe dehydration, eye signs of a vitamin A deficiency, and unconsciousness. Other cases needing inpatient care are: severe bilateral pitting oedema, marasmic kwashiorkor, and infants under 6 months with SAM. Note: Infants 6 months or older with SAM who weigh less than 4 kg are also treated in inpatient care following the same treatment protocol as infants under 6 months.
Micronutrient Deficiencies	Micronutrient deficiencies are a consequence of reduced micronutrient intake and/or absorption in the body. The most common forms of micronutrient deficiencies are related to iron, vitamin A, and iodine deficiency.
Moderate Wasting	Moderate wasting, or MAM, is defined by a MUAC \geq 115 mm and $<$ 125 mm or a WFH \geq -3 z-score and $<$ -2 z-score (WHO standards). Moderate wasting can be used as a population-level indicator, defined as WFH \geq -3 z-score and $<$ -2 z-score (WHO standards).
MUAC Indicator	Low MUAC is an indicator for wasting, used for a child 6–59 months. MUAC $<$ 115 mm indicates severe wasting, or SAM. MUAC \geq 115 mm and $<$ 125 mm indicates moderate wasting, or MAM. MUAC is a better indicator than WFH of mortality risk associated with acute malnutrition.
Nutritional Oedema	See Bilateral Pitting Oedema .
Oedematous Malnutrition	See Bilateral Pitting Oedema .

Outpatient Care Management of SAM without Medical Complications	A service/programme for outpatient care management of SAM for children 6–59 months with SAM without medical complications through the provision of routine medical treatment and nutrition rehabilitation with RUTF. Children attend outpatient care at regular intervals (usually once a week) and continue receiving treatment at home until weight recovery is achieved (usually 2 months).
Outreach Worker for CMAM	An outreach worker is a CHW, health extension worker (paid), or community volunteer (unpaid) who identifies and refers children with acute malnutrition from the community to CMAM and follows up with the children in their homes when required.
Overnutrition	Overnutrition occurs when the body has more nutrients than it needs. Overnutrition conditions include both overweight and obesity.
Pre-Service Training	Pre-service training is conducted at a teaching institution as part of the curriculum for a professional qualification. It can be at the pre-graduate, post-graduate, or diploma level (e.g., in medical or nursing schools). It includes theoretical and practical training. Practical training sessions can be, e.g., simulations, demonstrations, learning visits, internships, and mentoring.
Referral	A referral is a child who moved to a different component of the management of SAM (e.g., from outpatient care to inpatient care or vice versa) or for other medical treatment but who has not left the SAM treatment.
Routine Health Services	Routine health services refer to services provided at health facilities, depending on staff capacity and facility resources. These services include the essential or basic health care package and other services.
RUTF	RUTF is an energy-dense, mineral- and vitamin-enriched food specifically designed to treat SAM. RUTF has a similar nutrient composition to F-100. RUTF is soft, crushable food that can be consumed easily by children from the age of 6 months without adding water. Unlike F-100, RUTF is not water-based, meaning that bacteria cannot grow in it and that it can be used safely at home without refrigeration and in areas where hygiene conditions are not optimal. It does not require preparation before consumption. Plumpy'nut® is an example of a commonly known lipid-based RUTF. BP-100™ is an example of a commonly known non-lipid-based RUTF.
SAM	SAM is defined in children under 5 by the presence of bilateral pitting oedema or severe wasting (MUAC < 115 mm or a WFH < –3 z-score [WHO standards]). A child with SAM is highly vulnerable to illness and has a high mortality risk. SAM can also be used as a population-based indicator defined by the presence of bilateral pitting oedema or severe wasting (WFH < –3 z-score [WHO standards]).
Scale-Up	Scale-up involves the expansion of services (e.g., from the pilot phase to the programme phase, as part of a strategy to expand geographical coverage to the targeted area or nationally).
Self-Referral	Self-referral occurs when mothers/caregivers bring children to the outpatient care or inpatient care site without a referral from an outreach worker (e.g., CHW or volunteer).
Severe Wasting	Severe wasting is a sign of SAM. It is defined by a MUAC < 115 mm or a WFH < –3 z-score (WHO standards). Severe wasting is also called marasmus. The child with severe wasting has lost fat and muscle and appears very thin (e.g., signs of “old man face” or “baggy pants” [folds of skin over the buttocks]).

Sphere Project or Sphere Standards	The Sphere Project Humanitarian Charter and Minimum Standards in Disaster Response is a voluntary effort to improve the quality of assistance provided to people affected by disaster and to enhance the accountability of humanitarian agencies in disaster response. Sphere has established Minimum Standards in Disaster Response (often referred to as the Sphere Standards) and indicators to describe the level of disaster assistance to which all people have a right. See http://www.sphereproject.org (April 2011 version).
Stunting	Stunting reflects chronic undernutrition. It is defined by an HFA z-score below 2 SDs of the median (WHO standards). Stunting is a result of prolonged or repeated episodes of undernutrition starting before birth. This type of undernutrition is best addressed through preventive maternal health programmes aimed at pregnant women, infants, and children under age 2. Programme responses to stunting require longer-term planning and policy development.
Training of Trainers	TOT is a process in which an experienced trainer both expands the knowledge and skills of health care providers already experienced in the subject matter and trains them in adult training. These health providers then, in turn, pass on that expanded knowledge and skills to practitioners with less experience and expertise in the subject matter, perhaps in multiple trainings. Note that the knowledge and skills tend not to get diluted because the training remains the responsibility of trained trainers. As a result, TOT is recommended as a training method.
Transition of Programmes	Transition refers to the process leading up to hand-over of a health service that was set up in parallel with a national health system, including planning and preparation for the gradual transfer of roles and responsibilities, until hand-over is complete, e.g., hand-over of a temporary NGO-led emergency intervention to the MOH.
Undernourishment	Undernourishment is a population-level indicator that compares caloric availability per capita with minimum caloric requirements.
Undernutrition	Undernutrition is a consequence of a lack of nutrients caused by inadequate dietary intake and/or disease. It encompasses a range of conditions, including acute malnutrition, chronic malnutrition, and micronutrient deficiency. The different forms of undernutrition that can appear isolated or in combination are acute malnutrition (bilateral pitting oedema and/or wasting), stunting, underweight (combined form of wasting and stunting), and micronutrient deficiencies.
Underweight	Underweight is a composite form of undernutrition that includes elements of stunting and wasting. It is defined by a WFA z-score below 2 SDs of the median (WHO standards). This indicator is commonly used in growth monitoring and promotion and child health and nutrition programmes aimed at the prevention and treatment of undernutrition.
Wasting	Wasting is a form of acute malnutrition. It is defined by a MUAC < 125 mm or a WFH < -2 z-score (WHO standards).
WFA Index	The WFA index is used to assess underweight. It shows how a child's weight compares to the weight of a child of the same age and sex in the WHO standards. The index reflects a child's long-term growth pattern and current nutritional status.
WFH Index	The WFH index is used to assess wasting. It shows how a child's weight compares to the weight of a child of the same length/height and sex in the WHO standards. The index reflects a child's current nutritional status.